

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re U.S. Patent Application of:

APPLICANT: Yoshiya Hirase

SERIAL NO.: 10/740,034

FILING DATE December 18, 2003

EXAMINER: Zhe, Meng Yao

ART UNIT: 2195

ATTORNEY'S DOCKET NO.: 883.0006.U1(US)

TITLE: DYNAMIC PRIORITY INHERITANCE ALGORITHM FOR
SCHEDULING DYNAMIC CONFIGURABLE DEVICES

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313

Declaration Under 37 C.F.R. §1.131

Sir:

I, the inventor of the invention described and claimed in the above-identified patent application, declare as follows:

1. I conceived the invention in the United States or a NAFTA or WTO country, prior to December 23, 2002, the filing date of the U.S. Patent No. 7,111,089, to Karam.
2. Exhibit A is a true copy of the statistics window superimposed over the first page of the invention report. The statistics window shows that the invention report was created on November 13, 2002, and last saved on November 18, 2002, by me. The November 13, 2002, invention report creation date shows my date of conception to be no later than November 13, 2002, a date that precedes the December 23, 2002, filing date of U.S. Patent No. 7,111,089, to Karam.
3. Exhibit B is a true copy of the complete invention report created November 13, 2002, and last saved November 18, 2002, by me, referred to in item 2 above. Exhibit B shows both conception and diligence through drawing figures 1-3 and accompanying text, especially on pages 5-7, no later than November 18, 2002.

4. Diligence has been shown from November 18, 2002, by the filing of a provisional patent application, Serial No. 60/436,771, from which the current patent application claims priority under 35 U.S.C. 119(e), on December 26, 2002, the date of constructive reduction to practice.

I attest that the actions represented by the above exhibits occurred within the United States or a NAFTA or WTO country. All exhibits are true copies with the exception of being labeled herein for identification and redaction of confidential information.

I hereby declare that all statements made herein are true or are made on information and belief that is believed to be true. I further acknowledge that any willful false statements are punishable by fine or imprisonment, or both, in accordance with 18 U.S.C. § 1001; and that such willful false statements may jeopardize the validity of any patent that may issue from the application to which this Declaration pertains.

All Inventors:

Date: Feb 5, 2008

By: Yoshiya Hirase
Name: Yoshiya Hirase

Serial No.: 10/740,034
Art Unit: 2195

EXHIBIT A

The image shows a Microsoft Word document window. The title 'INVENTION REPORT' is at the top left. A large watermark of a paperclip is centered over the page. The document contains several sections: 'Title of Invention', 'Inventor(s) names', 'Home address', 'Nationality', 'Job title', and 'Location'. The 'Properties' pane is open on the right side, showing details like 'Created: Wednesday, November 13, 2002 12:35:00 PM' and 'Last saved by: Yoshiya Hirase'. The status bar at the bottom shows 'Page 7'.

Nokia Research Center, Japan

INVENTION REPORT

1

Title of Invention: Tired Multi-media Acceleration Scheduler Architecture for dynamic configurable devices

Please answer the questions on the next page

Inventor(s), names:

Yoshiya Hirase

Home address:

2-7-5,
A1

Nationality:Japan

Job title: **Research Engineer** Status: EmployeeLocation: **Tokyo**Phone Telefax
Email Project: **DRHW2002** Project Manager: **Hisashi Goto**Line Manager: **Eigo Mori**

Enclosures:

Disclosure of invention Prior art documents Other In my/our opinion the invention belongs to category: * (See page 4)
(Not necessary to fill in)

N/A

The invention becomes public on:

I/we consider the invention to belong to the category indicated above and to my/our best knowledge.
I am/we are the sole/and original inventor(s) of this invention.

Signature of inventor(s):

Date / 200?

2

INVENTION REPORT RECEIVEDCode: Classn: Rating: Place: Date: Signature:

3

COMPLETED BY MANAGERProject/Line Manager Name: *I have read and understood this Invention Report disclosure and I agree with the name(s) of the inventor(s).*Signature: Date:

Please complete the attached evaluation form on page 3 and sign and date all the pages of the disclosure.

Nokia Research Center, Japan

DISCLOSURE OF INVENTION

Please, describe your invention in the following order in a separate typed document.

1. A summary of the invention.
2. Attach drawings of the invention (Use reference numbers if applicable to link the drawings to the summary).
3. Describe the problem which the invention overcomes.
4. How was the problem solved earlier (Please list any relevant publications or other prior art known to you?)
5. Advantages of the invention (Technical, Commercial, Economical etc.). How does the invention improve over earlier solutions?
6. Explain, how the invention is/can be implemented (the best solution and other alternatives). If the invention is just an idea at the moment, please take care to notify the Patent Department when the invention is actually reduced to practice (implemented), and supply any supporting documentation.
7. Is it proposed to use the invention in a Nokia product? If so when? Which of the described alternatives is applied.
8. Will the invention be made public in any way? If so: How, when and where?
9. Enclose a more detailed description of the invention (if known at the moment).
10. Explain briefly what you would have to do to determine if a competitor was using this invention"
11. Any further comments.

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TO BE COMPLETED BY MANAGER**1. NOKIA USE**

Is this invention going to be used by Nokia?

| | |
|----------|--------------------------|
| Yes | <input type="checkbox"/> |
| Possibly | <input type="checkbox"/> |
| No | <input type="checkbox"/> |

In which Product(s)?

The invention

| | |
|---|--------------------------|
| (a) is fully developed | <input type="checkbox"/> |
| (b) is being developed further | <input type="checkbox"/> |
| (c) has no further work envisaged on it | <input type="checkbox"/> |

2. VALUE OF THE INVENTION

Describe the strategic importance to Nokia by rating 0-5

| | |
|--|--------------------------|
| 0 = None | <input type="checkbox"/> |
| 1 = Marginal | <input type="checkbox"/> |
| 2 = Modest (<i>easy to design around or modest potential for standard spec.</i>) | <input type="checkbox"/> |
| 3 = Moderate (<i>difficult to design around or high potential for standard spec.</i>) | <input type="checkbox"/> |
| 4 = Significant (<i>only commercially viable solution or very high potential for standard spec.</i>) | <input type="checkbox"/> |
| 5 = Key strategic value (<i>reads on standard spec.</i>) | <input type="checkbox"/> |

Further information

Are competitors likely to use the invention?

| | |
|-----|--------------------------|
| Yes | <input type="checkbox"/> |
| No | <input type="checkbox"/> |

Why?

3. PATENTING

Do you think we should file a patent application?

| | |
|-----|--------------------------|
| Yes | <input type="checkbox"/> |
| No | <input type="checkbox"/> |

Which countries are most important from the patenting point of view?

Urgency of filing

| | |
|------------|--------------------------|
| not urgent | <input type="checkbox"/> |
| urgent | , deadline |

If urgent, please explain why

Signed:

Date:



Nokia Research Center, Japan

INSTRUCTIONS FOR COMPLETING THE INVENTION REPORT

This invention report is used in cases where an invention has been made by an employee/contractor of the COMPANY. This invention report is **confidential**. Only the patent personnel are allowed to make copies of the signed invention reports in order to request opinions or reply to the inventor(s).

The signed invention report is to be given to the Project or Line Manager of the inventor. The Manager checks that the invention report has been described in a comprehensive manner. The Manager completes field 3 on the first page of the invention report, signs ALL the pages of the disclosure and completes the evaluation form. The Manager should sign the evaluation on page 3, and sign Section 3 on page 1. Thereafter the Manager sends the invention report to the Patent Department.

* INVENTION CATEGORIES

CATEGORY A

The exploitation of the invention is related to the COMPANY'S field of activities, and the invention resulted from an activity connected with the employee's normal duties, or essentially from exploitation of the experience obtained in the business or premises of the COMPANY, or the exploitation of the invention is not related to the field of activities of the COMPANY but the invention was made as a result of other, more specific duties assigned to the inventor at his/her work.

CATEGORY B

The exploitation of the invention is related to the COMPANY'S field of activities, and the invention was made in connection with the employment of the inventor, but in other connection than those mentioned in CATEGORY A.

CATEGORY C

The exploitation of the invention is related to the COMPANY'S field of activities, but the invention was made without any connection with the employment of the inventor.

CATEGORY D

The invention is not included in CATEGORIES A, B or C.

Please return the original completed form duly signed by inventors to:

Patent Department,
Nokia Japan Co.,Ltd.
Akasaka 81 Bldg. Tokyo

1. This invention proposes an essential architecture to exploit the capability of dynamic configurable devices to accelerate multi-media application software for mobile terminals. The basic idea is a two layered scheduler named 'TirEd Multi-media Acceleration Scheduler' (hereinafter TEMAS'), which copes with dynamic configurable hardware logic (hereinafter DCHL) on generic system software (See Figure 1, Figure 2). At this moment, configurable hardware have not been implemented into commercial mobile terminals due to maturity of the technology, but future generation's products require such as hardware in order to reduce power dissipation and extend adaptability to new applications. This invention introduces the core software architecture for future terminals.
2. See Figure 1.
3. The majority of multi-media applications such as MP3 player or movie players are working on a generic operating system (hereinafter OS), not real-time operating system. For examples, popular commercial products like SymbianOS or PocketPC are also categorized in such OS. Under such an OS, Applications are scheduled using a heuristic algorithm, which brings that which application to be scheduled is unpredictable. In this case, scheduling of DCHL occurs asynchronously, and any optimal methods to improve the performance of CL can't be conducted. The proposed architecture of scheduler enables to introduce improvement methods such as 'preloading' or 'configuration compression'.
4. At this moment, since DCHL has been used at research fields, not commercial products, no same architecture has been introduced to overcome the target problem because research activities has been mainly conducted to propose hardware architecture. Some studies use one layered scheduler to schedule algorithm logics because it is for dedicated hardware architecture, not generic one. Some methods such as 'preloading' or 'configuration compression' to improve potential of DCHL are proposed as studies from the hardware point of view.
5. The advantage of this invention is to introduce a fundamental architecture for DCHL when its hardware is used in future mobile terminals. This kind of scheduler architecture is required when a mobile terminal accelerated with DCHL is implemented and combined with generic OS. The proposed architecture is the fundamental framework for DCHL. Additionally, improvement methods proposed from other research activities can be integrated into the proposed architecture as one of extension modules.
6. The operating system scheduler (hereinafter OS scheduler) manages all applications that are ordinary applications and multi-media applications using DCHL. The Tire-1 Scheduler gets essential scheduling information about multi-media applications from OS scheduler via the Hook Module (See (a) in Figure 3). The most important information is the scheduling order of applications and those priorities. The scheduling order is needed to decide when 'preloading' is performed for DCHL. The priority of application gives the real priority of algorithm logic to be configured into and executed on DCHL. Since the priority of algorithm logic can't be decided until when an actual application is attached to it, this role of the Tire-1 Scheduler is essential in this sense. The scheduler also gets communication overhead from the device driver abstracting the difference of DCHL hardware (See (d) in Figure 3), which helps to adjust scheduling timing precisely. Additional algorithm can be extended using modules (See (e) in Figure 3). The Tire-2 Scheduler gets requests from the Tire-1 Scheduler (See (b) in Figure 3), then, it schedules actual algorithm logic to be executed inside DCHL (See (c) in Figure 3). To separate scheduler into two layers allows any kind of DCHL to get along with heuristic scheduler on generic OS architecture.
7. Yes. In near future, all mobile terminals are combined with DCHL in order to improve power dissipation and flexibility for new services. At that time, this proposed architecture is needed.

Nokia Research Center, Japan

8 to 11 non.

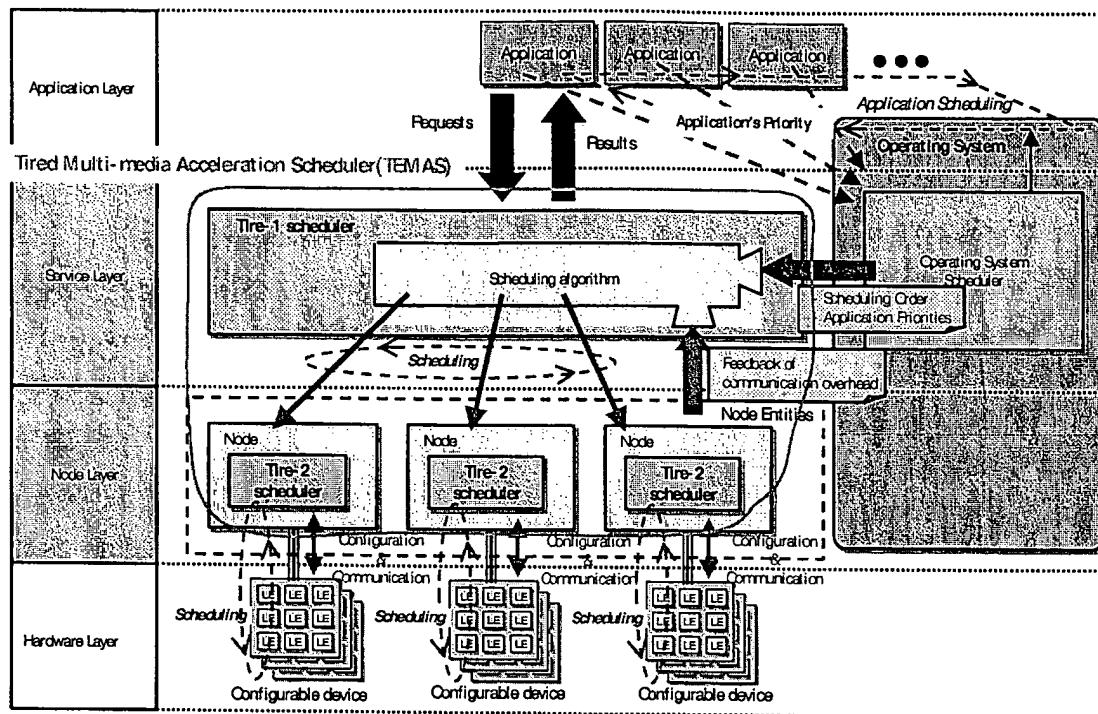


Figure 1. Tired Multi-Media Acceleration Scheduler (TEMAS)

Dynamic Configurable Hardware Logic (DCHL) is,

- It can accept several algorithm logic at the same time
- A algorithm logic can be configured while other logics are working

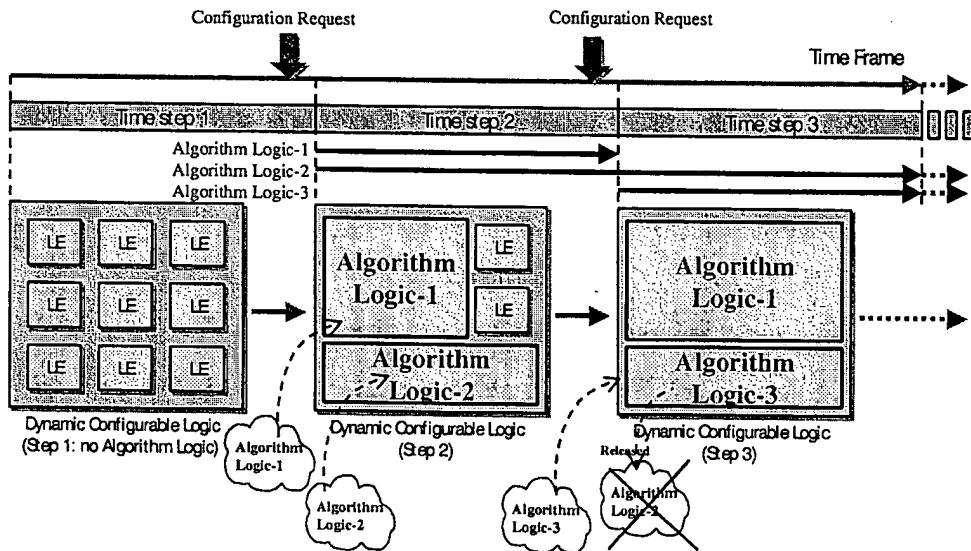


Figure 2. Dynamic Configurable Hardware

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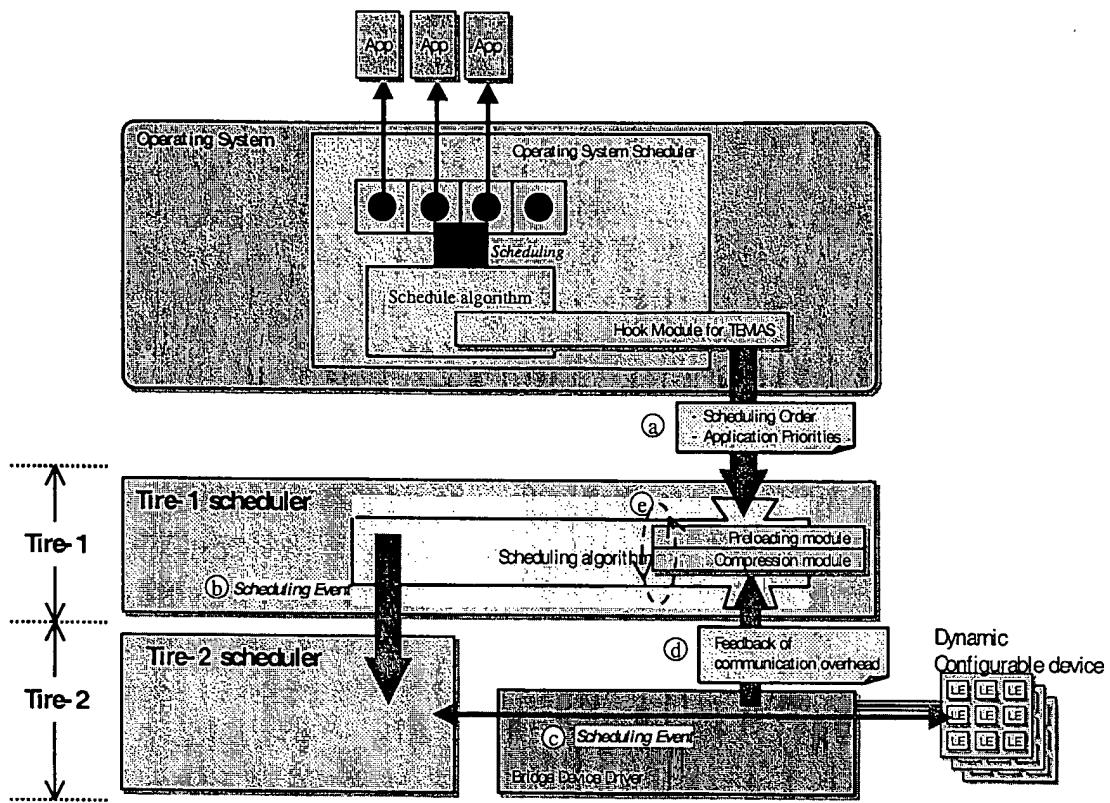


Figure 3. An example of implementation

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Exhibit C

Patent-Agency Harrington-Smith (EXT-RES/Usa)

From: Kasahara Motohiro (Nokia/Tokyo)
To: Patent-Agency Harrington-Smith (EXT-RES/Usa)
Cc:
Subject: New patent application / NC39080 and NC39081
Attachments: IR.zip(771KB)

Sent: Fri 12/13/2002 2:35 AM

Dear Mr. Smith,

I would like ask your assistance to file two U.S. patent application for the attached invention report. Two invention reports namely NC39080 and 39081, and supporting material are attached hereto. These inventions should be filed as patent separately.

The due date of these inventions is December 26. Because of very tight schedule, I think these may be filed as provisional patent application.

Please let me know if the above schedule is available, and if it is okay, expected first draft date.

Best regards,

KASAHARA, Motohiro

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Nokia-Japan Co., Ltd.
2-13-5, Nagata-cho, Chiyoda-ku
Tokyo 100-0014 JAPAN
Phone: 81-3-3592-5098
Fax: 81-3-3592-3555

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